FORMATION OF HYDROXYLAMINE FROM AMMONIA AND HYDROXYL RADICALS

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In the interstellar medium, as well as in icy comets, ammonia may be a crucial species in the first step toward the formation of amino-acids and other prebiotic molecules such as hydroxylamine (NH_2OH). It is worth to notice that the NH_3/H_2 ratio in the ISM is 3 10^{-5} compared the H_2O/H_2 one which is only 7 10^{-5}. Using either electron-UV irradiations of water-ammonia ices or successive hydrogenation of solid nitric oxide, laboratory experiments have already shown the feasibility of reactions that may take place on the surface of ice grains in molecular clouds, and may lead to the formation of this precursor. Herein is proposed a new reaction pathway involving ammonia and hydroxyl radicals generated in a microwave discharge. Experimental studies, at 3 and 10 K, in solid phase as well as in neon matrix have shown that this reaction proceed via a hydrogen abstraction, leading to the formation of NH_2 radical, that further recombine with hydroxyl radical to form hydroxylamine, under non-energetic conditions.